PHILOSOPHICAL TRANSACTIONS.

Septemb. 25. 1676. for the Months of *Auguſt* and *September*

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A Deſcription of an Hydraulique Engin, taken out of the Regiſter of the Royal Academy of the Sciences of Paris, *and inſerted in the* Journal des Scavans, 1675: *Engliſhed by the Publiſher, for the better Examination of thoſe that are ſkilfull in ſuch Engins here in* England. *See* Tab. 1. Fig. 1.

THE Effect of this Engin is, to throw out water to a great diſtance, and to what place you will, by the Compreſſion of the water forced out through a Tube, which turning every way at the end of it, is thereby fitted to direct the Jet of the water to the places where the fire is to be extinguiſhed. That which is moſt peculiar in this Engin, is, That the Courſe of the water, iſſuing out of the Tube that darts it, is continued, not being interrupted, even when the compreſſion of the Pump's Sucker ceaſes, that is, at the time when you raiſe it again: For, this affords a great eaſineſs to direct the water well where you would have it.

The Engin is a Cheſt of Copper, marked A, tranſportable by means of woodden barrs like a Sedan or Chair. This Cheſt is pierced with many holes above, BB, and holds within it the Body of a Pump EFM, whoſe Sucker DE is raiſed and abaſed by two Levers C, O; theſe Levers having each of them two arms, and each arm being fitted to be laid hold on by both hands of a man. Each Lever is pierced in the middle by a Mortaiſe, *a a*, in which an iron-nail, which paſſes through the handle of the Sucker, turns round when that Sucker is raiſed or lower'd. Near the body of the Pump there is a Copper-pot, IHK, joined to it by the Tube G, and having another Tube KNL, which in N may be turned every way.

To make this Engin play, water is powred upon the Cheſt, to enter in at the holes that are in the Cover thereof. This water is drawn into this body of the Pump at the hole F, at the time when the Sucker is raiſed; and when the ſame is let down, the Valve of the ſame hole F ſhuts, and forces the water to paſs through the hole M into the Tube G, of which the Valve H being lifted up, the water enters into the Pot, and filling the bottom, it enters through the hole K into the Tube KNL, in ſuch a manner, that when the water is higher than the Tube KNL, and the hole of the Tube G is ſhut by the Valve H, the Air incloſed in the Pot hath no iſſue, and it comes to paſs, that, when you continue to make the water enter into the Pot by the Tube G, which is much thicker than the aperture of the end L, at which it muſt iſſue, it muſt needs be, that the ſurplus of the water that enters into the Pot, and exceeds that which at the ſame time iſſues through the ſmall end of the Jet, compreſſes the Air to find place in the Pot: which makes, that, whilſt the Sucker is raiſed again to make new water to enter into the body of the Pump, the Air which has been compreſſed in the Pot, drives the ſurplus of the water by the force of its ſpring, mean time that a new compreſſion of the Sucker makes new water to enter, and cauſes alſo a new compreſſion of Air.

And thus the courſe of the water which iſſues by the Jet, is always entertained in the ſame ſtate; becauſe that proportionably, as the impulſe is ſtrong, the water entring faſter, and conſequently in greater quantity into the Pot, makes a greater compreſſion of the Air, which the more ſtrongly it is compreſſed and penned in, returns alſo with the greater force into its native ſtate by means of its ſpring, and conſequently throws out the water with greater force.

An Extract of a Letter written by Signor Caſſini *to the Author of the* Journal des Scavans, *containing ſome Advertiſements to Aſtronomers about the Configurations, by him given of the* Satellites of Jupiter, *for the years* 1676, *and* 1677, *for the verification of their Hypotheſes.*

THE Configurations of the *Satellites of Jupiter*, which are obſerved this year 1676, and which may be obſerved the next year, are of ſo great importance to the verifying of their Hypotheſes, that Signor *Caſſini* thought fit to advertiſe Aſtronomers, not to let this occaſion ſlip (which doth not preſent it ſelf but twice in 12 years) of obſerving them with a ſingular care and attention. For, by comparing the Obſervations of this year with thoſe of the next, they will find an apparent Inverſion of the whole Syſtem of the Satellites, which will come to paſs towards the end of *March* next, according to his particular Hypotheſes, which he propoſes to verifie by comparing theſe Obſervations with thoſe of *Galilæus*, *Marius*, and *Hodierna*, who undertook to dreſs Tables of their Motions.

Since the *Satellites* have the center of *Jupiter* for the center of their particular motions, and that the circles by them deſcribed are not directly oppoſit to the Earth nor the Sun, there is always a part of each of thoſe circles inferior to *Jupiter*, and another ſuperior to him, and *this*, being compared to the center of the apparent diſque of *Jupiter*, is ſometimes turned to the South, ſometimes to the North, by a perpetual change of inclination to our viſual ray. *Galilæo* believed formerly, to have found Rules of this Phænomenon, or perpetual change of inclination, by ſuppoſing the planes of thoſe circles to be always parallel to the Ecliptique; for, by *Galilæi*'s ſuppoſition, the Satellites in the ſuperior part of their circles ſhould have their latitude, in reſpect of the center of *Jupiter*, ever contrary to the latitude of *Jupiter* in reſpect of the Ecliptique; which the Obſervations of this year contradict, foraſmuch as the Satellites, being in the ſuperior part of their circles, near to their conjunction

with

Tab. I

Ph Tr N° 128

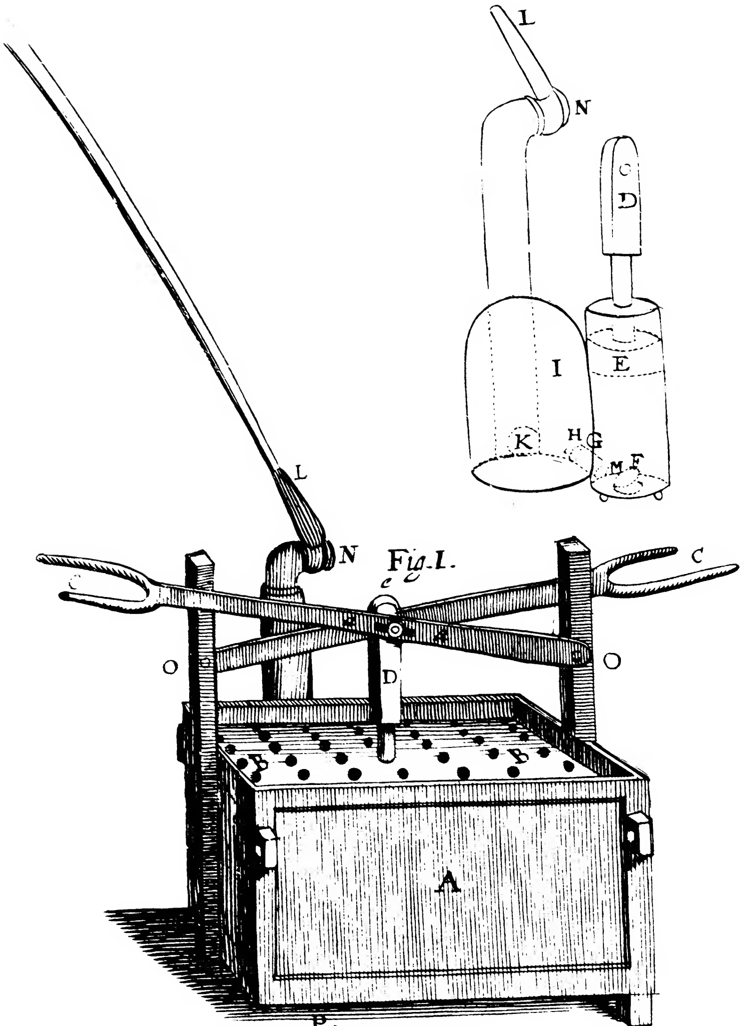

Fig. I.

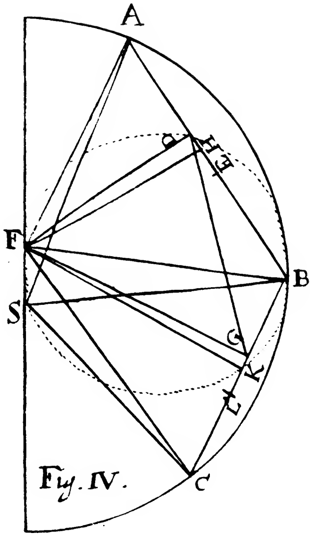

Fig. IV.

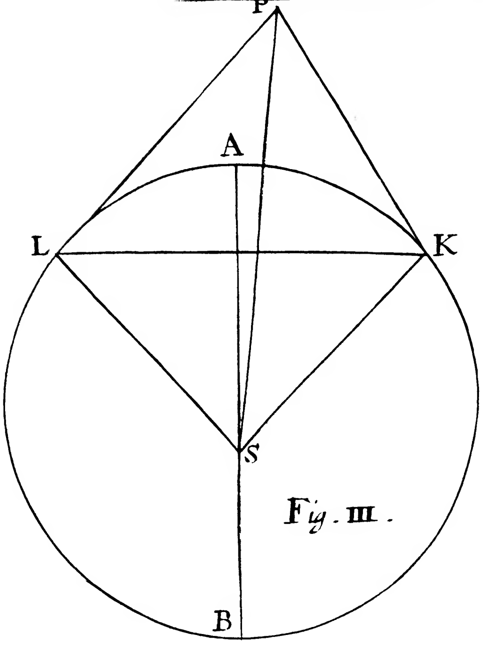

Fig. III.

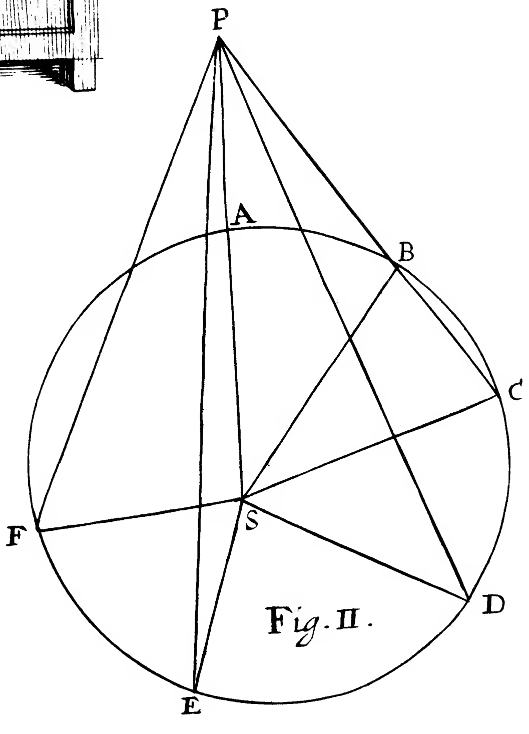

Fig. II.